TEST REPORTS

Sony MDS-501 MiniDisc Recorder

KEN C. POHLMANN • HAMMER LABORATORIES

Audio product launches usually follow a strict evolutionary path. The first models are normally large and AC-powered; they're followed by smaller components, with battery-powered portables arriving last. This sequence follows the natural engineering progression, enabling companies to begin recouping their investments more quickly than they might otherwise.

Sony's MiniDisc launch has gone the opposite way. The first models were portables, followed by car and component models, with the largest version coming last. Although certainly costly for Sony, this inversion served to emphasize MD's strength as a portable format. Without the support of home decks, however, the format would be something of a two-legged stool. And, eventually, they came.

The MDS-501 is the first full-size home MD recorder (the earlier MDS-101 was a "midi"-size component). At first glance, it might be mistaken for a CD player, but a closer look at its loading slot shows that no CD could ever enter there. Instead, either prerecorded or blank MD cartridges are loaded into the slot, much the way you'd insert a disc into a car CD player. An LED lights to show when a disc is loaded, and an eject button is used to retrieve discs. There is a power on/off button, but the deck will also turn on automatically when an MD is inserted.

Besides the usual transport controls, there is a small volume control that varies the output level of a nearby ¼-inch headphone jack. An AMS (Automatic Music Sensor) knob is used to cue to the beginning of a specific track, specify the order of programmed tracks, perform edit functions, enter text data, and set the clock. The AMS knob operates like a jog dial in that it is continuously variable without stops; in addition, it can be pressed to conveniently play or pause a disc. Incidentally, when you hit the play button, playback starts instantaneously, thanks to a memory-start function that keeps a small amount of data ready in memory so that the player doesn't have to wait for the disc.

A display button lets you see either the name of the current track or the time remaining on the disc. The display itself tells you everything you need to know about the MDS-501's operation. A music calendar indicates the track being played back, edited, or recorded. A surrounding grid also differentiates between prerecorded and user-recorded discs: It blanks when a recordable disc is played. An alphanumeric display shows disc and track titles, track numbers, total or elapsed playing time, date and time of a recording, and editing messages such as "Erase," "Divide," and "Combine," as well as diagnostic messages. A

DIMENSIONS
17 INCHES WIDE, 3⅜ INCHES HIGH, 14 INCHES DEEP

PRICE
$1,000

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peak-reading stereo bar-graph meter is used to monitor recording and playback levels.

Less frequently used controls are hidden behind a hinged door on the front panel's right side. These include buttons for editing operations, a button for selecting playback modes such as random and programmed play, high-speed search buttons, and a button for selecting A-B, track, or disc repeat. A knob is provided for setting input levels from analog sources; each channel can be adjusted separately. There are also switches for selecting either analog or digital inputs, setting recording or playback to be triggered by an external timer, and setting the internal clock's date and time.

Around back, the MDS-501 sports four phono jacks for analog line-level input and output and two Toslink optical connectors for digital audio input and output. The MDS-501 accommodates only the CD-standard 44.1-kHz sampling rate.

The RM-D1M infrared remote control supplied with the MDS-501 is a formidable handful of fifty-six buttons. Functions include transport control, power switching, text entry, direct track access (up to twenty-five tracks), track-sequence programming (also up to twenty-five tracks), random and repeat play, track intro-scan (6, 10, or 20 seconds), and 3-second auto-spacing between tracks—useful when recording tapes from an MD so that cassette-deck track-search features can be used reliably with them. The remote can also be used to synchronize a Sony CD player with the MDS-501 for making recordings. Curiously, the remote does not let you manipulate any of the MDS-501's editing features; perhaps Sony is afraid of accidental button-pushing.

Operation of the MDS-501 is fairly straightforward. Playback works much as with a CD player, except that disc and track titles are displayed. Specific tracks can be cued by pressing direct-track-access or forward/reverse scan buttons on the remote or by twisting the front-panel AMS dial right or left. Other functions, such as random track playback and track-sequence programming, are also easily accomplished.

MEASUREMENTS

Recording and playback measurements were made through the analog inputs; measurements given are for the worse of the two channels. The review sample was a hand-built prototype and may differ slightly from final production units. In particular, Sony says that production units will exhibit at least 5 dB better signal-to-noise ratio.

Line input for indicated 0 dB ..... 800 mV
Line output for indicated 0 dB ..2.08 volts

PLAYBACK

Frequency response .....
..... 20 Hz to 20 kHz +0.02, –0.05 dB
Channel separation
1 kHz ..... 68.4 dB
20 kHz ..... 67.8 dB
Signal-to-noise ratio (A-wtd.) ..... 90.5 dB
Dynamic range ..... 87.2 dB
Distortion (THD+N at 1 kHz)
at 0 dB 0.008%
at –20 dB 0.049%
Linearity error (at –90 dB) ..... –0.6 dB
Interchannel phase shift (at 20 kHz) ..0.9°

RECORD/PLAYBACK

Frequency response .....
.....20 Hz to 20 kHz +0.02, –0.11 dB
Channel separation
1 kHz ..... 52.6 dB
20 kHz ..... 52.0 dB
Signal-to-noise ratio (A-wtd.) ..... 86.3 dB
Dynamic range ..... 82.5 dB
Distortion (THD+N at 1 kHz)
at 0 dB 0.01%
at –20 dB 0.21%
Linearity error (at –90 dB) ..... +0.3 dB
Interchannel phase shift (at 20 kHz) ..1.5°

What clearly differentiates the operation of the MDS-501 from that of a CD player, however, is its recording function. It is especially important to note that the MDS-501 has two recording modes. In the ALL REC ON mode, it automatically erases the entire recorded contents of the inserted MD. If you want to keep the existing contents of an MD and add new data, you must set the recording mode to ALL REC OFF before you load the disc. Like all other consumer digital audio recorders, the MDS-501 incorporates the Serial Copy Management System (SCMS) and will therefore refuse to make a direct digital copy of a source that is itself a direct digital copy of an original.

Recording itself is pretty easy. You simply select analog or digital input and press the record and play buttons simultaneously. The deck automatically locates blank portions on the disc to accommodate the new data, or it erases the existing data, depending on the recording mode. In either mode, the deck displays the time remaining on the disc. Level-setting is unnecessary in direct-digital recording (as from the digital output of a CD player to the MDS-501's digital input), but when recording from the analog inputs you must adjust levels manually. In either case, track numbers can be marked automatically or manually.

Changes made to an MD through recording are finalized only when you update the disc's table of contents (TOC) by ejecting it or hitting the power switch to go to standby mode. Like cassettes and floppy disks, MD's have a record-protect tab to prevent accidental erasure.

The edit buttons and AMS dial enable you to select a number of special features. When turned on, the Level Sync function automatically marks a new track whenever a silence occurs (new tracks are always automatically marked when recording digitally from a CD), or you can manually add track numbers by pressing the record button while recording. The Divide function lets you split an existing track into two or more tracks and automatically renumbers succeeding tracks up to a maximum of 255 (a track must be at

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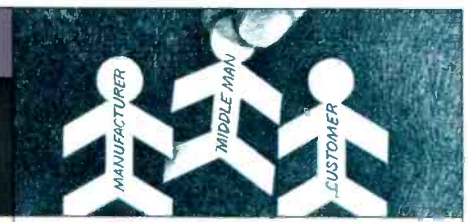

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least 8 seconds long to be counted). Or you can go in reverse with the Combine function, putting two or more sequential tracks together into one and renumbering the succeeding tracks accordingly.

A Rehearsal mode enables you to audition an edit point before committing to it, and in the process to vary that point over a range of −128 to +127 steps of 0.06 second each. You can also change the numerical order of the tracks on a disc and erase a whole disc, a track, or part of a track. All of these editing tasks are fast and easy to perform, in part because they require no physical alteration of the data on a disc. All that gets changed is the MD's table of contents, which is what tells the player where everything is located on the disc, and no edit is final until the TOC is rewritten with your changes.

After dividing and conquering your tracks, you'll want to label them. The MDS-501 enables you to create disc and track titles of as many as 100 capital and lower-case letters, numbers, and symbols, to a maximum of 1,700 characters per disc. The labeling is easily accomplished using either the front-panel AMS dial or the remote control's keypad to select characters.

Like other MD components, the MDS-501 uses Sony's ATRAC perceptual-coding system to reduce the amount of data that must be recorded on the disc by about 80 percent (currently the only practical method of squeezing CD-length recordings into such a small package). Traditional measurements are still useful for diagnosing gross performance problems in MD decks, but perceptual coding shifts more of the burden onto listening tests. I was therefore especially careful in my auditioning of the MDS-501, using a variety of prerecorded MD's and both 60- and 74-minute recordings made on our test sample.

In direct comparison with my reference CD player, the MDS-501 sounded subtly but distinctively different. There is no mistaking the MD sound: It creeps out just like Dan Rather's suppressed Texas drawl. Although the sonic artifacts were perhaps slightly less obvious than with previous MD

decks, they were still clearly present. Bench tests indicated that the MDS-501's ATRAC encoder does operate a little differently in some respects from the one used in earlier MiniDisc recorders, particularly at very high frequencies, but just as no amount of speech coaching could ever relieve Mr. Rather of his accent, perhaps MD will always have a slight twang to the trained ear.

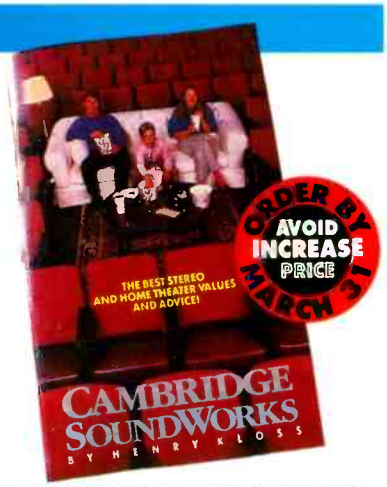
The principal ATRAC artifacts are a watery, slightly unstable shifting in the tonal characteristics and imaging of middle frequencies and a smearing of high frequencies and transients. For example, cymbals sometimes sound slightly odd in an MD recording. To put this into perspective, the artifacts are fairly subtle and have been completely inaudible to about half the people I've put through double-blind comparisons. Given that MD was never meant to compete with CD on sound quality, but instead to make some of the benefits of CD more portable, you might not consider the format's sonic shortcomings very important. In other words, if you'll be using the MDS-501 primarily to make recordings for portable listening, you probably won't care much about ATRAC's relatively minor flaws.

After listening for ATRAC artifacts, I turned my ear to other, more mundane considerations, such as noise, distortion, and so forth. I did not hear any outstanding problems, and in general the MDS-501's basic electronic performance seemed on a par with that of previous MD recorders, or similar to that of a good portable CD player. Subsequent bench measurements essentially confirmed that judgment. My final test (a favorite here at Hammer Laboratories) was a good fist-slamming into the top and sides of the recorder, which demonstrated that the MDS-501 was completely resistant to vibration.

Operationally, the MDS-501 was great. If you are into editing, you'll love the flexibility afforded by the combination of disc recording and a long playback memory buffer. You can cobble together pieces from all over the disc and still have the result play back continuously. Other features also worked well. I especially liked the AMS jog wheel and the way it lets you quickly select tracks. This is an absolutely terrific feature, and I hope it eventually shows up on CD players.

The MDS-501 will encourage your secret recording-engineer persona to emerge from hiding, indulging itself in elaborate editing projects that would be all but impossible on nonprofessional tape equipment. But even if you just want to record MD's for portable listening or to enjoy noncritical listening at home, the MDS-501 is ready to accommodate you. □

"Honey, it's Mr. Mamoulian. He wants to know if he can sit on your subwoofer—his chiropractor says it's good for his prostate."



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